Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

(1) This question paper contains two pages.

(2) All Questions are Compulsory.

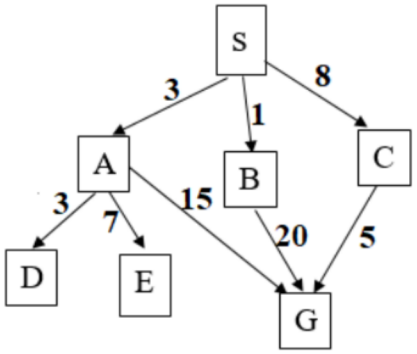
(3) All questions carry equal marks.

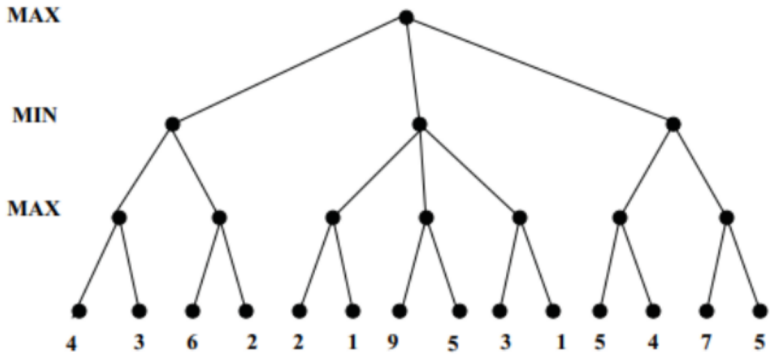
(4) Answer to each new question is to be started on a fresh page.

(5) Figures in the brackets on the right indicate full marks.

(6) Assume suitable data wherever required, but justify it.

(7) Draw the neat labelled diagrams, wherever necessary.

Question No.		**Max. Marks**
Q1 (a)	Apply the Uniform cost search and Breadth First search on the graph given below and compare the respective traversal paths. 	[10]
Q1 (b)	Apply Bag of Words algorithm on the following corpus and generate corresponding vector representations. i. It was the best of times ii. It was the worst of times iii. It was the age of wisdom iv. It was the age of foolishness	[05]

Q2 (a)	i. Formulate the Initial and Goal state and Operators for the following problem: Assume that there is a monkey in a room with some bananas hanging out of reach from the ceiling, but a box is available that will enable the monkey to reach the bananas if he climbs on it. Initially, the monkey is at A, the bananas at B, and the box at C. The monkey and box have height LOW, but if the monkey climbs onto the box, he will have height HIGH, the same as the bananas. The actions available to the monkey include GO from one place to another, PUSH an object from one place to another, CLIMB onto an object, and GRASP an object. Grasping results in holding the object if the monkey and object are in the same place at the same height. The monkey wants to get the bananas. **OR** ii. Solve the following 8-puzzle problem using A*algorithm, show the traversal path and calculations. Initial State: 1 2 3 / 8 _ 4 / 7 6 5 Goal State: 2 8 1 / _ 4 3 / 7 6 5	[08] [08]
Q2 (b)	i. Describe any two types of AI Environments with help of a suitable example. **OR** ii. Describe the structure of the AI agent which learns from previous experience using a suitable example.	[07] [07]
Q3 (a)	Discuss the various problems and solutions in Hill climbing algorithm using a suitable tree representation.	[05]
Q3 (b)	i. Optimize the MinMax algorithm for the given decision tree by applying alpha-beta pruning on it. Also, find the value of alpha(α) and beta(β) at each node in the given tree while optimizing it.  **OR** ii. Solve the following by using backward chaining inference technique to find Anish's liking in courses. A. Anish only likes easy courses	[10] [10]

	B. Computer courses are hard C. All electronics courses are easy D. DSP is an electronics course.	
Q4 (a)	i. Solve the following using resolution after converting it to CNF Form: Given: "Horses are animals" Prove that: "The head of a horse is the head of an animal." **OR** ii. Solve the following by using forward chaining inference technique: Given: i. Bob is a buffalo ii. Pat is a pig iii. Buffaloes outrun pigs iv. Prove that: Bob outruns Pat	[10] [10]
Q4 (b)	Solve the following Cryptarithmetic problem: WATER + SLAKES = THIRST	[05]
Q5 (a)	Elaborate Inference in Belief Networks with help of a suitable example.	[10]
Q5 (b)	i. Describe Lexical and Syntactic analysis with an appropriate example. **OR** ii. Elaborate the role of Language Modelling in Artificial Intelligence.	[05] [05]